



ISSN 2357-0725

<https://jsasj.journals.ekb.eg>

JSAS 2022; 7(2): 119-126

Received: 06-09-2022

Accepted: 09-10-2022

**Salman, A. M. A.****Hany, A. Foad****Huda, H. I. Assaker**

Plant protection Department

Faculty of Agriculture

Sohag University

Sohag

82524

Egypt

**Attia, S. A.**

Plant Protection Research Institute

Agricultural Research Center

Dokki, Giza

Egypt

**Corresponding author:****Huda, H. I. Assaker**[huda11assaker@gmail.com](mailto:huda11assaker@gmail.com)

## Quantitative survey of scale insects and their associated natural enemies infesting common fruit crops trees in Sohag governorate

Salman, A. M. A., Attia, S. A., Hany, A. Foad and Huda, H. I. Assaker

### Abstract

Fruit crops trees in sohag Governorate are infested with many scale insects and mealybugs, which affect their production qualitatively and quantitatively. The most important of these fruit crops are the following: Citrus trees: there were 17 insect species belonging to 13 families of 6 orders. 12 species was recorded as pests the most abundant one was *Aonidiella aurantii*, 4 species recorded as predator and one parasitoid. The five species that were collected from arthropods differentiated as 3 species as pests and two species as predators. *Aphytis* sp and *Cheletogenus ornatus* were the most abundant associated parasitoid and predator. Mango trees: - there were 11 insect species belonging to 6 families of 3 orders these orders represented by 9, 1 and 1 species, respectively were considered as 9 pests attack mango trees and two associated natural enemies, parasitoid and predator. The most abundant pests infest mango trees at Sohag Governorate the diaspidid hard scale insect *A. tubercularis* and the coccid soft scale insect *M. mangiferae*. Guava trees: there were 12 insect species belonging to 6 families of 3 orders. These orders represented by 9, 1 & 2 species, respectively were considered as 9 pests attack guava trees and three associated natural enemies, parasitoid and 2 predators. The coccidae have long been considered major and sever pests of guava trees where the *Ceroplastis cirripediformis* was the most abundant pest cause high injury followed by the two diaspididae pests *Hemiberlisia latania*. Date palm trees :- there were 9 species belonging to 6 families of 3 orders these orders represented by 6, 2 & 1 species, respectively were considered as 6 pests attack date palm trees and three associated natural enemies, 2 parasitoid and 1 predator. The most important pests of date palm. *Fiorinia phoenicis* followed by *Parlatoria blanchardii*. Fig trees:- there were 12 species belonging to 9 families of 3 orders. These orders represented by 9, 2 & 1 species, respectively.

## INTRODUCTION

Scale insects found in different parts of the world fall within 23 Families while only 12 out of that number are found in Egypt. The most important of these are 3 families being armored scale insects (Diaspididae), mealybugs (Margarodidae and Pseudococcidae) and soft scale (Coccidae) and these are dangerous species that attack different important economic crops in Egypt. Most of the species belongs of these families are polyphagous, eurymorous, and attack various parts of the host plant, leaves, stem, bark, crown, fruits and roots. The main injury caused due to their ingestion of plant sap, reduction of plant vigor, drop leaves or spottily yellowing, deformation of shoot and twig, blister like galls, fruit drops and effect on the normal physiological activities of the trees with effect on nitrogen, protein, phosphorus, potassium, calcium, magnesium, chlorophyll "a" and "b". (Hassan *et al*, 2012). The economic importance of date palm tree *Phoenix, dactylifera* L. exceeds its nutrition value as the most valuable fruit. Preserve Egypt's international status as a large producer of dates in the world, requires tackling pests that attack palm trees. Diseases and pathogen pests are causing great economic loss to the growers, reducing about 52 % of the total yield (Sanad *et al*, 2017).

Citrus come second only to grapes in planting production of fruit trees worldwide (Spiegel-Roy and Goldschmidt, 1996), The California red scale is one of most important pest infested citrus trees in different parts of the world (Karaca, 1998; claps *et. al.*, 2001 and Abd-Rabou, 2009). Mango was considered the third major fruit crop after citrus and grapes. According to the survey of ministry of agriculture of Egypt and infested with 14 species belonging to four families: Diaspididae, Coccidae, Pseudococcidae and Margarodidae, among which were the two species *Aulacaspis tubercularis* and *Kilifia acumulata* (Kwaiz, 1999 and Attia, 2010). Guava was of the most important and popular fruits in Egypt, The surveyed scale insects in Qaliobiya were belonging to the same four families (Coccidae, Diaspididae, Pseudococcidae and Margarodidae) where, the highest population pests were *Pulvinaria psidii* (Maskell), *Ceroplastis cirripediformis* (Comstock) (first recorded), *Aspidiotus nerii* (Bouche) and *Lepidosaiaphes ulmi*

L. Guava trees were infested by other scale insects but with low level as mealybug (*I. seychellarum* & *M. Hibiscus*) and some of soft scale insects as, *Coccus hesperidum*, *Saissetia coffeae*, *Saissetia oleae*. (Attia, 2010). Fig trees infested with four species of scale insect, these were: *Asterolecanium pustulans* Ckll. (Fam. Asterolecanidae), *Hemiberlisia latania* sign., *Paratoria olea* Colv (Fam. Diaspididae) *Ceroplastes rusci* L. (Fam. Coccidae). The first species was the most common on fig trees. Eraki (1991). Date palm trees infested with 11 insect pests belonging to 9 families from the orders Isoptera, Homoptera, Lepidoptera and Coleoptera. The predominant insets were two scale insects *Parlatoria blanchardii* ; the red date scale *Phoenicoccus marlatti* (Cockerel); *Dysmicoccus brevipes* (Cockerel) (El-Sherif *et al.* 1998) .

## MATERIAL AND METHODS

### Survey of insects and mealybugs infesting some fruit crop trees and their associated enemies

#### Areas of study

The present study was carried out in Shandawil Horticulture Research Station, Sohag area, Sohag Governorate during two successive consecutive seasons (2019-2020). Seven areas planted with seven different fruit crop trees (orange, lemmone, mandarine, mango, guava, fig and date palm) were selected. These different fruit crop trees were infested with scale insects and mealybugs. The selected orchards do not receive any chemical control during both studied seasons and two years prior to the experiment. All trees received same horticultural practices during studied period.

#### Sampling methods

Ten trees were selected from each fruit crop under experiment, which were approximately similar in age, size, height and vegetation. Samples were picked up monthly throughout the study. Samples size was 100 leaves or leaflets for each selected fruit crop trees, where 10 leaves were taken from each tree, two leaves for each of cardinal directions (east, west, north & south) and tree core.

Samples were kept in polyethylene bags with minute holes and transferred directly to the laboratory for examination. Samples were examined visually or by the aid of stereoscopic

binocular, then insects and their different associated natural enemies were identified, counted and recorded to determine the level of infestation (low, moderate or high), where we referred to these level by this signs (+, ++ & +++), respectively.

- Highly abundant (+++) when insect population found (over 20 insects / sample).

- Moderate abundant (++) when insect population found (from 10 to 20 insects / sample).

- Low abundant (+) when insect population found (less than 10 insects / sample). The surveyed insects were identified by the specialists in the Scale insect and taxonomic Departments, Plant Protection Research.

## RESULTS AND DISCUSSION

### I-Survey studies

#### 1-Survey of scale insects and mealybug infest citrus trees and their associated natural enemies in sohag Governorate.

The present study was carried out to survey the scale insects and mealybugs species that infest citrus trees at Sohag Governorate during 2019/2020 seasons.

The overall results are summarized in Table (1) to investigate the scale insects and mealybug species recorded on citrus trees according to their orders, families and insect species, also the associated

**Table (1):** A partial taxonomic list of destructive and beneficial species recorded by direct count from citrus during two successive seasons 2019/2020 in Sohag Governorate.

Scientific name and	classification position		status	Occurred period	Abundance
	Order	Family			
<i>Aonidiella aurantii</i>	Hemiptera	Didspididae	Pest	All the year	+++
<i>Lepidosaphis bekii</i>	Hemiptera	Didspididae	Pest	All the year	++
<i>Milviscutulus mangiferae</i>	Hemiptera	Coccidae	Pest	All the year	++
<i>Coccus hesberidum</i>	Hemiptera	Didspididae	Pest	Mar.-Aug.	+
<i>Planococcus citri</i>	Hemiptera	Pesudococcidae	Pest	May-Nov.	++
<i>Maconellicoccus hirsutus</i>	Hemiptera	Pesudococcidae	Pest	Aug.-Dec.	++
<i>Feresia vergata</i>	Hemiptera	Pesudococcidae	Pest	May-Nov.	+
<i>Icerya purchasi</i>	Hemiptera	Monophelipidae	Pest	All the year	+++
<i>Aleurocanthus woglumi</i>	Hemiptera	Aleurodidae	Pest	Apr.-Aug.	+
<i>Phyllocnistis citrella</i>	Lepidoptera	Gracillariidae	Pest	All the year	++
<i>Aegyptobia</i> spp.	Parasitiformes	Tenuipalpidae	Pest	All the year	+
<i>Brevipalpus obovatus</i>	Parasitiformes	Tenuipalpidae	Pest	All the year	+
<i>Tetranychus urticae</i>	Parasitiformes	Tetranychidae	Pest	All the year	+
<i>Agestemus exertus</i>	Parasitiformes	Stigmatidae	predator	Apr.-Dec.	
<i>Cheletogenus ornatus</i>	Parasitiformes	Cheyletidae	predator	All the year	+++
<i>Aphytis</i> spp.	Hymenoptera	Aphelinidae	Parasitoid	All the year	+++
<i>Dicrodiplosis manihoti</i>	Diptera	Cecidomyiinae	predator	May-Dec.	++
<i>Scymnus syriacus</i>	Coleoptera	Coccinellidae	predator	Apr.-Jun	+
<i>Rodolia cardinalis</i>	Coleoptera	Coccinellidae	predator	Apr.-Jun	++

parasitoids and predators were investigated. The results showed that, there were 17 insect species belonging to 17 genera under 13 family of 6 orders (Hemiptera, Hymenoptera, Lepidoptera, Coleoptera, Diptera and Parasitiformes). 12 species was recorded as pests, 4 species recorded as predator and one parasitoid. The five species that were collected from arthropods differentiated as 3 species as pests and two species as predators

Through this study, we can concluded that the diaspidae or armored scale insects in general are one of the most economically most important and destructive groups due to their great reproductive capacity, survival ability and the difficulty in chemical control *Aonidiella aurantii* was the most abundant pest infest citrus trees, at sohag, also *Aphytis* sp and *Cheletogenus ornatus* were the most abundant associated parasitoid and predator.

Seven species of scale insects infesting citrus trees included *A. aurantii* (Maskell) and two associated parasitoid *Aphytis lingnanensis* Compere and *Habrolepis aspidioti* Compere and Annecke in Beni- Suf. (Moustafa, 2012).

14 insect species belonging to 13 genera under 7 families of 4 orders. In addition one species of mites was recorded. while, 6 species considered as a pests, 4 predators and 5 species as parasitoids at Qena Governorate (Haris, 2015).

**Table (2):** A partial taxonomic list of destructive and beneficial species recorded by direct count from mango during two successive seasons 2019/2020 in Sohag Governorate.

Scientific name and	classification position		Status	Occurred period	Abundance
	Order	Family			
<i>Aulacaspis tubercularis</i>	Hemiptera	Didspididae	Pest	All the year	+++
<i>Lepidosaphes palidulla</i>	Hemiptera	Didspididae	Pest	All the year	++
<i>Aonidiela aurantii</i>	Hemiptera	Didspididae	Pest	All the year	++
<i>Hemiberlesia lataniae</i>	Hemiptera	Didspididae	Pest	All the year	+
<i>Milviscutulus mangiferae</i>	Hemiptera	Coccidae	Pest	All the year	+++
<i>Saissetia coffeae</i>	Hemiptera	Coccidae	Pest	All the year	+
<i>Ceroplastis floridensis</i>	Hemiptera	Coccidae	Pest	From Mar. to Dec.	+
<i>Planococcus citri</i>	Hemiptera	Pseudococcidae	Pest	From May. to Dec..	+
<i>Icerya purchasi</i>	Hemiptera	Monophlebidae	Pest	From Mar. to Oct.	++
<i>Aphytis</i> spp.	Hymenoptera	Aphelinidae	Parasitoid	All the year	
<i>Rodolia cardinalis</i>	Coleoptera	Coccinellidae	Predator	From Apr. to JUN.	++

## 2-Survey of scale insects and mealybug infest mango trees and their associated natural enemies in sohag Governorate

The present study carried out to survey the scale insects and mealybug attacking mango trees at Sohag Governorate during 2019/2020 seasons.

Data present in table (2) revealed that there were 11 insect species belonging to 11 genera under 6 families of 3 orders (Hemiptera, Hymenoptera and Coleoptera). These orders represented by 9, 1 and 1 species, respectively were considered as 9 pests attack mango trees and two associated natural enemies, parasitoid and predator. This study revealed that, the diaspided hard scale insect *A. tubercularis* and the coccid soft scale insect *M. mangiferae* were the most abundant pests infest mango trees at Sohag Governorate. Attia (2010) investigated the occurrence and ecology of scale insects in four mango plantations in AlQaliobiya governorate, Egypt. They recorded 14 species belonging to four families: Diaspididae, Coccidae, Pseudococcidae and Margarodidae, among which were the two species *Aulacaspis tubercularis* and *Kilifia acuminata* identified in the present work. They also found that the population densities of the 14 species were largely depending on temperature of about 25 °C and relative humidity of 55%. Furthermore, a survey of scale insects and mealybugs on mango trees at Giza Governorate, during two successive years 2014 and 2015 showed that mango trees were infested by 12 species of scale insects and mealybugs belonging to four families: Diaspididae, Coccidae, Monophlebidae and Pseudococcidae. The white mealybug, *Icerya seychellarum* (Westwod) was the

most dangerous and abundant of the collected species followed by *Insulaspis pallidula* (Green) then *Kilifia acuminata* (Signoret) and *Hemiberlesia lataniae* (Signoret)- (El-Razzik 2017). The white hard scale insect *Aulacaspis tubercularis* Newstead (Diaspididae) and a green soft scale insect *Kilifia acuminata* Signoret (Coccidae) were the most dangerous pests infest mango trees as well as four saprotrophic fungi as secondary infection at Ismaelia (Hashem, 2021)

## 3-Survey of scale insects and mealybug infest guava trees and their associated natural enemies in sohag Governorate.

The present study carried out to survey the scale insects and mealybug infest guava trees, also natural enemies were recorded in Sohag Governorate during 2019/2020 seasons.

The summarized data which tabulated in table (3) showed number of scale insects and mealybug infest guava trees, where 11 insect species belonging to 11 genera under 6 families of 3 orders (Hemiptera, Hymenoptera and Coleoptera). These orders represented by 9, 1 & 2 species, respectively were considered as 9 pests attack guava trees and three associated natural enemies, parasitoid and 2 predators. The coccidae have long been considered major and sever pests of guava trees where the *C. cirripediformis* was the most abundant pest cause high injury followed by the two diaspidid pests (*H. latania* and *A. aurantii*), *I. seychellarum* and the white fly *A. psidii*

Nine scale insect species (Hemiptera: Coccoidea) belongs to four families were collected during updated survey of scale insects and mealybug infest guava trees at Qaliobiya Governorate for two

successive years. the most serious soft scale insect was *Pulvinaria psidii* Maskell (Hemiptera: Coccidae) Three predators, *Rodalia cardinalis* Mulsant, *Chilocorus bipustulatus* L. (Coleoptera:

Coccinellidae) and *Amblyserius swiriskii* (Athias-Henriot) (Acari: Phytoseiidae) were collected, (Bakr, *et.al.* 2012).

**Table (3):** A partial taxonomic list of destructive and beneficial species recorded by direct count from guava during two successive seasons 2019/2020 in Sohag Governorate.

Scientific name and	classification position		status	Occurred period	Abundance
	Order	Family			
<i>Hemiberlesia lataniae</i>	Hemiptera	Didspididae	pest	All the year	++
<i>Aonidiela aurantii</i>	Hemiptera	Didspididae	pest	All the year	++
<i>Lepidosaphes ulmi</i>	Hemiptera	Didspididae	pest	All the year	+
<i>Ceroplastes cirripediformis</i>	Hemiptera	Coccidae	pest	From Mar. to Dec.	+++
<i>Pulvinaria psidii</i>	Hemiptera	Coccidae	pest	All the year	+
<i>Saissetia coffeae</i>	Hemiptera	Coccidae	pest	All the year	+
<i>Icerya seychellarum</i>	Hemiptera	Monophlebidae	Pest	From Mar. to Oct.	++
<i>Feresia vergata</i>	Hemiptera	Pesudococcidae	pest	From May. to Dec..	++
<i>Aleuroclava psidii</i>	Hemiptera	Aleyrodidae	pest	All the year	++
<i>Encarsia Sophia</i>	Hymenoptera	Aphelinidae	Parasitoid	All the year	++
<i>Aphytis spp.</i>	Hymenoptera	Aphelinidae	Parasitoid	All the year	+++
<i>Dicrodiplosis manihoti</i>	Diptera	Cecidomyliinae	predator	May-Dec.	+
<i>Rodolia cardinalis</i>	Coleoptera	Coccinellidae	predator	From Apr. to JUN.	++

This work was carried out on fruiting guava trees on local variety mammouralduring two successive seasons (2013/2014 and 2014/2015). Survey of insects pests infested guava trees was carried out in private orchards at Zagazig, Abou-Hammad and Faqus centeries, Sharkia Governorate.The most surveyed insect belonging to three order i.e., Hemiptera, Diptera and coleoptera and (18) species were recorded: *Coccus hesperidum* L., *Pulvinaria psidii* Maskell, *Ceroplastes floridensis* comst., *Ceroplastes rusci* L., *Aspidiotus nerii* Bouche, *Hemiberlesia lataniae* signoret; *Aonidiella aurantii* Maskell; *Icerya seychellarum* Mask; *Icerya aegypticae* Dgl.; *Empoasca decipiens* Paoli, *Empoasca decedens* Paoli ; *Aphis gossypii*; Glover ; *Bemisia tabaci* Gennadius and ; *Nezera viridula* L. Diptera species were *Ceratitis capitata* wiedemann and *Bactrocera zonata* Saunders. Coleoptera species were *Carophilus hemiptrus* L. and *Carpophilus dimidiatus* L. Such surveyed orders and species were arranged descendingly, concerning its density (Mohsen, 2018).

#### 4-Survey of scale insects and mealybug infest date palm trees and their associated natural enemies in sohag Governorate

The survey of scale insects and mealybug infest date palm trees in Sohag Governorate provided extensive list of principal insect pests and the associated natural enemies.

Data present in table (4) clearly investigated that the list of insects consists of 9 species belonging to 8 genera under 6 families of 3 orders (Hemiptera, Hymenoptera and Coleoptera). These orders represented by 6, 2 & 1 species, respectively were considered as 6 pests attack date palm trees and three associated natural enemies, 2 parasitoids and 1 predator. The armored insects were the most important pests of date palm. *F. phoenicis* was the most important pest followed by *P. blanchardii*. In a field survey conducted in Gujarat, India, during 1990-91, *Parlatoria blanchardii*, *Hemiberlesia lataniae* and *Phoenicococcus marlatti* were identified as pests of dates. Their natural enemies included the predators *Cybocephalus sp.*, *Menochilus sexmaculatus* [*Cheilomenes sexmaculata*], *Pharoscygnus horni*, *P. flexibilis* and *Chilocorus nigritus* [*C. nigrita*], and the parasitoid *Archenomus sp.* ( Murlidharan,1993).

**Table (4):** A partial taxonomic list of destructive and beneficial species recorded by direct count from date palm during two successive seasons 2019/2020 in Sohag Governorate.

Scientific name and	classification position		status	Occurred period	Abundance
	Order	Family			
<i>Fiorinia phoenicis</i>	Hemiptera	Didspididae	Pest	All the year	+++
<i>Parlatoria blanchardii</i>	Hemiptera	Didspididae	Pest	All the year	++
<i>Aonidiella aurantii</i>	Hemiptera	Didspididae	Pest	All the year	+
<i>Phoenicococcus marlatti</i>	Hemiptera	Phoenicococcidae	Pest	All the year	++
<i>Feresia vergata</i>	Hemiptera	Pesudococcidae	Pest	From May. to Dec..	+
<i>Icerya aegyptiaca</i>	Hemiptera	Monophlebidae	Pest	From Mar. to Oct.	+
<i>Aphytis spp</i>	Hymenoptera	Aphelinidae	Parasitoid	All the year	+++
<i>Pteroptrix aegyptica</i>	Hymenoptera	Aphelinidae	Parasitoid	All the year	+++
<i>Rodolia cardinalis</i>	Coleoptera	Coccinellidae	Predator	From Apr. to Jun.	+

8 Homopteran species (*Platyplura arabica*, *Ommatissus binotatus*, *Pseudaspido proctus hyphaenicus*, *Maconellicoccus hirsutus*, *Aonidiella orientalis*, *Fiorinia linderiae*, *Parlatoria blanchardii* and *Phoenicococcus marlatti*) were recorded during the survey of insect pests and mites associated with infested roots, stems, leaves, inflorescence and dates [*Phoenix dactylifera*] of date palm trees in the Al-Dakhliya region in Oman from January 1994 to December 1996. (Elwan, 2000).

### 5-Survey of scale insects and mealybug infest fig trees and their associated natural enemies in Sohag Governorate.

The survey of Hemipteran scale insects and their associated natural enemies gave us a list of more differentiated scale insects pests infest fig trees resulted in harm or death of the trees. The destructive scales and their associated insects were clearly demonstrated in table (5).the referred list consists of 12 species belonging to 12 genera under

9 families of 3 orders (Hemiptera, Hymenoptera and Coleoptera). These orders represented by 9, 2 and 1 species, respectively were considered as 9 pests attack fig trees and three associated natural enemies, 2 parasitoid and 1 predator. The survey arthropods pest infest fig trees six districts of the three major fig-production regions of the Western Cape over two production seasons on a monthly basis from September 2006 to April 2008 investigated that fig trees attacked by five different species of scale insects as following: The grapevine mealybug *Planococcus ficus* (Signoret) (Pseudococcidae), two species of soft scales (Coccidae), the soft brown scale, *Coccus hesperidum* L., the black soft scale *Parasaissetia nigra* (Nietner), formerly also known as *Saissetia nigra* (Nietner) the fig wax scale, *Ceroplastes ficus* (Newstead), also occasionally occurs on figs. The polyphagous red scale, *Aonidiella aurantii* (Maskell) (Diaspididae) which is a common pest on citrus was observed on fruit, (Wohlfarter, 2011).

**Table (5):** A partial taxonomic list of destructive and beneficial species recorded by direct count from fig during two 2019/2020 in Sohag Governorate.

Scientific name and	classification position		status	Occurred period	Abundance
	Order	Family			
<i>Asterolecanium pustulans</i>	Hemiptera	Asterolecanidae		All the year	+
<i>Hemiberlisia lataniae</i>	Hemiptera	Didspididae	pest	All the year	+++
<i>Aonidiella aurantii</i>	Hemiptera	Didspididae	pest	All the year	+
<i>Saissetia coffeae</i>	Hemiptera	Coccidae	pest	All the year	++
<i>Ceroplastis rusci</i>	Hemiptera	Coccidae	pest	From Mar. to Dec.	++
<i>Coccus hesperidum</i>	Hemiptera	Coccidae	pest	All the year	+
<i>Planococcus ficus</i>	Hemiptera	Pesudococcidae	pest	From May. to Dec	+
<i>Icerya aegyptiaca</i>	Hemiptera	Monophlebidae	Pest	From Mar. to Oct.	++
<i>Aleuroclava psidii</i>	Hemiptera	Aleyrodidae	pest	All the year	++
<i>Aphytis spp</i>	Hymenoptera	Aphelinidae	Parasitoid	All the year	+++
<i>Encarsia sophia</i>	Hymenoptera	Aphelinidae	Parasitoid	All the year	+
<i>Rodolia cardinalis</i>	Coleoptera	Coccinellidae	predator	From Apr. to Jun.	++

## REFERENCES

- Abd-Rabou, S. (2009). Parasitoids attacking *Aonidiella aurantii* (Maskell) (Homoptera: Diaspididae) with emphasis on parasitoid fauna of this species in Baharia oasis, Egypt. J. of Agric. Res., 87(4): 939-946.
- Attia, Sahar, A. (2010). Ecological studies of scale insects infesting mango and guava trees and their control in Qaliobiya governorate. Ph.D. Thesis, Ain Shams. Univ.: 198.
- Bakr , Reda, F. A. , B. M. Rawda, M. F. Saber, H.S. Laila and A. A. Sahar(2009). Ecological and taxonomic studies on the scale insects that infest mango trees at Qaliobiya governorate. Biological Sciences, 2(2):69-89.
- Claps, L. , A. Terán. (2001). Diaspididae (Hemiptera: Coccoidea) Asociadas a Cítricos en la Provincia de Tucumán (República Argentina), Neotropical Entomology 30(3): 391-402.
- El-Razzik, A., I. Maha, E.A. Osman, A. M. Serag and S.S. Elbadawey (2017). Survey of scale insects and mealybugs on mango trees and ecological studies of *Insulaspis pallidula* (Green) at Giza Governorate. Egyptian Journal of Agricultural Research, 95(2): 691-708
- El-Sherif, S.I., E.A. Elwan and M.I.E. Abd-El-Razik (1998). Insects pests of date palm trees in northern Sinai Egypt, First International Conference on Date Palm (Al-Ain, UAE, March 8-10) 255-262 pp.
- Elwan, A. A., (2000). Agricultural Research Centre, Ministry of Agriculture and Land Reclamation, Giza, Egypt. English language Egyptian Journal of Agricultural Research 78(2), 653-664.
- Eraki, M.M. (1991). Ecological studies on certain scale insects infesting fig trees. M. SC. Fac. of Agric. El-Azhar unvi.
- Haris, H.M.A. (2015). Seasonal and toxicological studies on the red scale insect, *Aonidiella aurantii* (Maskell) on citrus in Upper Egypt. Fac.of Agric. Sohag Univ.230 P.
- Hashem, M. H. (2021). Some scale insects and fungi infesting mango trees in Ismailia, Egypt. Agricultura Tropica et subtropica,( 54): 136–146.
- Hassan, N. A., S. G. Radwan, and O.M.N . El-Sahn (2012). Common scale insects (Hemiptera:Coccoidea) in Egypt, Egypt. Acad. J. Biolog. Sci., 5(3): 153 -160
- karaca, I. (1998). Parasitization efficacy of *Aphytis melinus* DeBach (Hymenoptera: Aphelinidae) as affected by host size and size distribution of *Aonidiella aurantii* (Maskell)(Homoptera: Diaspididae) in a lemon orchard. Turkiye Entomol. Dergisi, 22, 101–108.
- Kwaiz, Fayza, A.M. (1999). Ecological and toxicological studies on the mango soft scale, *Kilifia acuminata* (Signoret) with special reference to insecticide residues in Mango fruits. Ph. D. Thesis Fac. of Agric Cairo Univ., 171 pp.
- Mohsen, A.M.A.(2018). Survey of insect pests infested guava orchards and infestation of main and offseasons guava crops a year round by fruit fly, *Ceratitidis cap.*Middle East Journal of Applied, ( 08 ): 1264-1272.
- Moustafa, M (2012). Scale insects (Coccoidea: Hemiptera) infested citrus trees and their natural enemies, with a key of these pests in Egypt, Egyptian Academic Journal of Biological Sciences: Entomology, 5(1): 1-23.
- Muralidharan, C.M. (1993). Scale insects of date palm (*Phoenix dactylifera*) and their natural enemies in the date groves of Kachchh (Gujarat). Plant Protection Bulletin 45(2&3): 31-33.
- Sanad,A.S, A.S. Elhalawany, M.M. Aboseta and H. EL-khateb (2017).Partial Survey of Data Palm Dust Mite, *Oligonychus afrasiaticus* (McGregor) in Egypt including Historical trait, ACARINES 11:53-55.
- Spiegel-ROY, P. and E. E. Goldschmidt (1996). *Biology of Citrus*, 59 text-figures. Cambridge: Cambridge University Press, New Phytol. (136, 369±374)
- Wohlfarter, M., J. H. Giliomee and E. Venter (2011). A Survey of the Arthropod Pests and Plant Parasitic Nematodes Associated with Commercial Figs, *Ficus carica* (Moraceae), in South Africa, African Entomology 19(1):165-172

المسح الكمي للحشرات القشرية و البق الدقيقى و الأعداء الحيوية  
المصاحبة لها التى تصيب أشجار الفاكهة الشائعة فى محافظة  
سوهاج

تصاب اشجار محاصيل الفاكهة الاساسية فى محافظة سوهاج  
بالعديد من الحشرات القشرية و البق الدقيقى التى تؤثر على انتاجها  
كما وكيفا. ومن أهم هذه المحاصيل التالى:

محصول الموالح :- تصاب أشجار الموالح ب 15 نوع من  
الحشرات تابعة لـ 6 رتب و 13 عائلة منها 12 نوع من الحشرات  
سجلت كافة و أهمهم الحشرة القشرية الحمراء و 4 أنواع سجلت  
كأعداء حيوية و أهمهم طفيل الأفييس و نوع واحد من العناكب و  
سجل كمفترس

محصول المانجو:- تصاب أشجار المانجو ب 11 نوع تابعة لـ 3  
رتب و 6 عائلات حيث سجلت منها 9 أنواع من الحشرات كافة و  
أهمهم حشرة المانجو القشرية البيضاء و حشرة المانجو الرخوة و  
سجلت نوعين كأعداء حيوية.

محصول الجوافة:- تصاب أشجار الجوافة ب 12 نوع من  
الحشرات تابعة لـ 3 رتب و 6 عائلات حيث سجلت منها 9 أنواع من  
الحشرات كافة و أهمهم حشرة الجوافة الشمعية و حشرة اللاتنيا  
القشرية و سجلت ثلاث أنواع من الأعداء الحيوية نوع واحد من  
الطفيليات نوعين من المفترسات.

محصول النخيل:- تصاب أشجار النخيل ب 9 أنواع من الحشرات  
تابعة لـ 3 رتب و 6 عائلات حيث سجلت منها 6 أنواع من الحشرات  
كافة و أهمهم حشرة الفيورنيا و حشرة النخيل القشرية البيضاء و  
سجلت ثلاث أنواع من الأعداء الحيوية نوعين من الطفيليات و نوع  
من المفترسات.

محصول التين:- تصاب أشجار التين ب 12 نوع من الحشرات  
تابعة لـ 3 رتب و 9 عائلات حيث سجلت منها 9 أنواع من الحشرات  
كافة و أهمهم حشرة التين الشمعية و حشرة اللاتنيا القشرية و  
سجلت ثلاث أنواع من الأعداء الحيوية نوعين من الطفيليات و نوع  
من المفترسات.